Received 4 August 2013
Revised 16 October 2013
Accepted 22 November 2013

A game-theoretical model of bank foreign direct investment strategy in emerging market economies

Aidan O'Connor
Département de Management, Systèmes et Stratégie, France Business School, Poitiers, France
Francisco J. Santos-Arteaga
Departamento de Economía Aplicada II, Universidad Complutense de Madrid, Madrid, Spain, and
Madjid Tavana
Business Systems and Analytics Department, La Salle University, Philadelphia, Pennsylvania, USA and Business Information Systems Department, University of Paderborn, Paderborn, Germany

Abstract

Purpose – The purpose of this paper is to propose a game-theoretical model for commercial bank foreign direct investment strategy, government policy and domestic banking industry interactions in emerging market economies and demonstrate the application of this strategy to the banking system. Government policy and domestic banking industry interactions in emerging market economies and demonstrate the application of this strategy to the banking system.

Design/methodology/approach – The paper develops a game-theoretical model to analyze the optimality of the limiting entry strategy followed by a given domestic institutional sector when considering the entry applications of foreign banks in the domestic financial system. The model analyzes the strategic options available to an emerging market country with a relatively underdeveloped banking system when deciding whether or not and to what extent allow for the entrance of better reputed and more technologically advanced foreign banks in its domestic financial system.

Findings – The paper shows that the progressive liberalization of entry restrictions would define the perfect Bayesian equilibria of the subsequent set of continuation games and the respective payoffs derived from this liberalization as the domestic economy integrates and competes within the global financial system.

Originality/value – Banks operating in the international financial market have incentives to invest directly in emerging market economies and governments have incentives in allowing foreign banks entry to their market. As banking systems in these economies are generally underdeveloped, opening the financial system to foreign competitors could lead to a decrease in the market share of local banks. Eventually foreign banks could control the banking system and could *de facto* control the money supply.

Keywords Foreign direct investment, Emerging markets, Game theory, Banking, Entry strategy, Cooperation game

Paper type Research paper

1. Introduction

Banks operating in the international financial market have incentives to invest directly in emerging market economies and governments also have incentives in allowing

The authors would like to thank the anonymous reviewers and the editor for their insightful comments and suggestions.

International Journal of Bank Marketing
Vol. 32 No. 3, 2014
pp. 194-222

0265-2323
DOI 10.1108/IJBM-08-2013-0077

foreign banks entry to their market. Banks seek returns in the form of profits based on the transfer of technology, management, products, processes, capital and information. Governments seek to modernize the banking system through competition and spillover effects, stabilize the financial system and create credit in previously underserved parts of the economy.

As banking systems in emerging market economies are generally underdeveloped, foreign banks entering such an economy would have a competitive advantage in terms of management knowledge and organizational competencies, and superior technology, products and processes that could be easily transferred at a low-marginal cost. Furthermore, as innovation in products, processes and technology is continuous and cumulative, over time foreign banks established in an emerging market economy would have additional advantages over domestic banks.

What foreign banks operating abroad lack most is local financial market knowledge. Usually foreign banks overcome this by acquiring a domestic bank and thereby acquiring a retail network and a customer base to develop in terms of processes, products and profitability. It also acquires personnel that have knowledge and experience. In some emerging market economies the full acquisition of a domestic bank is prohibited or some foreign banks may only invest in a domestic bank up to specified limit. Therefore, the alternative is to establish their own branch or wholly owned subsidiary, although it is rare for a bank to establish *de alio* a foreign wholly owned subsidiary to compete in commercial banking with domestic banks.

Assuming there is inherent instability in an emerging economy banking system there is an incentive for governments to control the banking system as much as possible while incentivizing and motivating foreign banks to enter, either through indirect investment, that is, portfolio investment, or direct investment. We propose a game-theoretical model for foreign bank strategy, government policy and domestic banking industry interactions in emerging market economies and demonstrate the application of this strategy to the banking system.

The reminder of this paper is organized as follows. In Section 2 an overview of trade and foreign direct investment in banking is outlined. In Section 3 we discuss the competitive advantages of foreign banks within underdeveloped financial systems and relate them to the Vietnamese economic transition toward a market economy. In Section 4 we present an overview of modeling strategic interactions within an international business environment. In Section 5 we present the game-theoretical model proposed in this study. In Section 6 we describe the limitations of the model and discuss managerial implications. In Section 7 we present our conclusion and future research directions.

2. Trade and foreign direct investment in banking

This section overviews the theory of international trade and foreign direct investment, built to understand the strategic behavior of multinational firms, and relates its main features to the characteristics of (multinational) banks.

2.1 Banks and international trade

The neo-classical Heckscher-Ohlin theory of comparative advantage in international trade, extended by Samuelson (1948), focusses on differences between industries within countries and not between the same industries in different countries. It is based on factor endowments and location-specific differences. Trade patterns would tend to be between countries with different factor endowments. Furthermore, this theory assumes

that products are standardized and does not allow for differences in service quality between firms. These latter ones are, however, a source of competitive advantage between banks as the heterogeneous service factor is a basis for competing in an industry dominated by homogenous products. In addition, foreign direct investment is not incorporated into the theory. It has been amended subsequently to moderate some of these constraints. Nevertheless, while most of the classical and neo-classical theories of trade may be applied to trade in services, their general applicability to trade in banking services is limited. Although Hindley and Smith (1984), consider that the theory of comparative advantage may be applied to trade in most service industries, Arndt (1988) considers that the Heckscher-Ohlin theory of trade is not applicable to trade in banking services.

On the other hand, the theory of intra-industry trade emphasises an industrial organization approach, focussing on, among others, economies of scale and scope, product differentiation and innovation, and includes foreign direct investment as a reason for intra-industry trade:

- Product differentiation and innovation are especially relevant to banking, where there is continual innovation in products. However, innovative products are easily imitated due to low barriers to imitation, and therefore these innovations are rapidly neutralized by many capable competitors eventually leading to a system with widespread homogenous products. There is a short-term competitive advantage for the product innovator, while there is a longer term competitive advantage in innovation in processes and through differentiation in the service factor.
- Economies of scale may be achieved by spreading risk, sharing information and processing larger volumes of transactions, especially in centralized processing centres, offshore or otherwise. Economies of scope may be achieved by producing additional products from the banking industry, both retail and investment banking, or from related industries with an existing range of products, and through sharing information common to different product and customer types.
- Banking is an industry in which there is a high proportion of intra-industry trade, between countries with similar levels of economic development and similar factor endowments, as well as, with other countries that are less economically developed and with different factor endowments. In this regard, Buckley and Hashai (2009) consider an approach to international trade theory based primarily on the Heckscher-Ohlin theory of comparative advantage, and the ownership, location and internalization paradigm. We build on this type of approach through the following subsection.

2.2 Foreign direct investment in banking

Banks invest directly in foreign countries to exploit competitive advantages in products, processes, technology, service factor, brand and reputation. The ownership, location, internalization paradigm developed and subsequently amended by Dunning (1988, 1998, 2001) is an alternative perspective on the motives for internationalization. We relate Dunning's paradigm to the main characteristics of the banking industry as follows:

- The ownership advantages that banks possess include proprietary information, technology, human capital, and brand. Asset-based ownership advantages, economies of common governance, and institutional ownership advantages are also specified by Lundan (2010). At the same time, Verbeke and Yuan (2010)

propose an alternative typology of ownership advantages based on the geographic source and the transferability of these advantages to other countries. Additionally, banks produce complex knowledge or information-based products. Other advantages are economies of scale and scope and access to capital at a lower cost. These must be bank specific to be internalized and to sustain its advantage through distinctive competencies.

- Location advantages consist of available skilled labour, government incentives and taxation policy, institutional and market regulations, infrastructure and access to markets and business opportunities. According to O'Connor (2005), some of the determinants for banks' foreign direct, or indeed indirect, investment are based on location advantages, such as, the characteristics of the country and its banking market dynamics. Banks may also want to internalize and maintain knowledge spillovers within the bank rather than in the industry.
- An internalization approach to the theory of multinational banking, where a bank transfers a monopolistic advantage abroad, mainly due to transaction cost advantages, is considered by Casson (1989). However, there is limited applicability of the internalization advantages aspect when there are restrictions on licensed wholly owned foreign banks' direct investment or requirements to transfer products, processes and knowledge.

The ownership, location, internalization paradigm of foreign direct investment is also applicable to financial services foreign direct investment. Applying this eclectic theory of international production to multinational banks, Gray and Gray (1981) consider that multinational banks' ownership-specific advantages are a pre-requisite for internalization.

3. Competitive advantages of foreign banks within the domestic financial system

There exists a recognized trade-off between the openness and deepening of a country's financial system and the inherent risk derived from its exposure to the international financial market and its fluctuations, see International Monetary Fund (2012) and Beck and Feyen (2013) for a review of the literature. Following the International Monetary Fund (2012, p. 4), financial deepening "can be understood as a process of increasing the efficiency, depth (e.g. credit intermediation and market turnover), breadth (e.g. range of markets and instruments), and reach (e.g. access) of financial systems (Goyal *et al.*, 2011)." In this sense, Beck and Feyen (2013) defined the financial possibilities frontier of a country as a trade-off between the depth (openness in the current paper) and volatility (stability) of its financial system. While there is extensive empirical work illustrating a positive relationship between financial depth and economic growth – see Levine (2005) and Aghion *et al.* (2009) – recent research has highlighted important non-linearities in this relationship and even a range of financial depth where this relationship becomes negative, see Aghion *et al.* (2005) and Arcand *et al.* (2012).

The banking systems of many lower income and transition economies have experienced significant changes in ownership through the last decade, shifting away from state interventionism toward privately owned systems, often controlled by foreign banks. The International Monetary Fund (2012, p. 9) illustrates how, as of 2009, the foreign bank penetration has more than doubled for the median lower income

country since 1995. These authors suggest several policies to foster the deepening of the corresponding financial systems and reinforce transition, while requiring the continuous monitoring of the process to prevent potential crisis-triggering scenarios.

Consequently, financial sector reform has been advanced as a policy in many developing countries and emerging market economies in recent years. In particular, institutional reform and the liberalization of the entry of foreign banks is considered to be a prerequisite for economic development. As described in Section 2, the argument in favour of these policies is that foreign banks are independent, transfer knowledge and risk management techniques and introduce products and processes that assist in the development of banks and the banking industry. This leads to the following proposition:

P1. Foreign banks invest in emerging markets due to the potential profits derived from their expected economic growth. In exchange, domestic financial systems may benefit from the knowledge, technology and organizational competencies developed by foreign banks.

The underdevelopment of the financial systems of emerging market economies can be observed in the limited access of households and firms to financial services. As the financial system deepens, the scope and range of financial services expand while being initially limited to small segments of the population. The International Monetary Fund (2012, pp. 14 and 15) has examined this phenomenon using indicators of the use of financial services from household and firm-level surveys. The authors show the substantial increment in loans and deposits that took place among low-income countries and emerging markets, particularly in the latter ones, from 2004 to 2009.

Clearly, the more a bank has transferable resources, capabilities and distinctive competencies, such as, brand and reputation, access to capital resources at a lower cost, more innovative and efficient production technologies, more competent management, and innovative products the greater is its competitive advantage. Irrespective of the mode of entry, foreign banks must have an actual, or perceived, advantage over domestic banks to attract customers; otherwise, they would not enter a foreign country. That is, foreign banks must provide alternative and better products to meet customers' demands through innovation, especially to high net worth individuals and informationally transparent corporate customers. As a result, foreign banks could have a further source of competitive advantage in terms of customer responsiveness. It therefore follows that:

P2. Foreign banks' strategic and competitive advantages allow them to focus on specific segments of the market and acquire the most reputable and profitable customers.

Detragiache *et al.* (2006), analyze the issue of focussing on the best customers by foreign banks in developing economies. These authors conclude that the welfare to the country is not improved as those customers excluded from the foreign banks are at a disadvantage to those that have access. Note that *P2* counters the argument that foreign banks are at a disadvantage due to the market information advantages of domestic banks and the competition for market share with state-owned banks.

A dual banking system could therefore emerge. However, due to the restrictions on entry that may be imposed by a government, foreign banks could not dominate the

market to the extent that they could control *de facto* the money supply, see Detragiache *et al.* (2006) and Agenor (2001). In this regard, among the proposals on how to improve the efficiency of domestic financial systems, we have the classical works of McKinnon (1973) and Shaw (1973), who suggested reducing the role of the state in the financial system. This role ranges from the state ownership and direct control of banks to interest rate ceilings, taxation and credit allocation constraints. Even though many countries have liberalized and deregulated their financial systems, entry restrictions and barriers to foreign capital flows limiting competition persist, leaving the process incomplete, see Abiad *et al.* (2008):

P3. Foreign banks expect the government to further deregulate the banking sector following initial financial and economic developments. As a result, the ability of the government to control and contain information flows would progressively decrease.

The macroeconomic stability of a country is required to proceed with its financial deepening process, see Boyd *et al.* (2001), Abiad *et al.* (2008), and International Monetary Fund (2012) for several empirical comparisons across countries. As emphasized by Beck (2013) when referring to the emerging market economies that open their financial system to the international market

"Accessing the vast risk-pooling and diversification opportunities offered by international capital markets, while adopting appropriate macro-prudential policies to dampen the impact of potentially disruptive volatile international capital flows, can be important for such economies. Constraints imposed by market size can be partly overcome through regional integration and foreign bank entry, although risks have to be carefully managed, as evidenced by the global financial crisis."

Thus, as highlighted by Beck *et al.* (2013), the softening of activity restrictions may lead to an increment in competition among banks, which improves the depth and efficiency of the domestic financial system. However, this may also increase the instability of the banking sector. Beck *et al.* (2013) illustrate how the relationship between competition and stability differs across countries based on their market structure, regulatory frameworks and institutional environments. Similar comments follow when considering the risk-taking incentives of banks and the regulatory framework of countries, including deposit insurance, capital regulation and activity restrictions, see Hellmann *et al.* (2000). In particular, instruments such as deposit insurance may have perverse incentives on banks, forcing them to take excessive risks. These perverse incentives tend to arise in weak supervisory frameworks prone also to corruption, see Demirguc-Kunt and Detragiache (2002). It therefore follows that:

P4. Governments attempt to control the level of investment in the banking sector by foreign banks. This is done to control the domestic banking system and money supply and to ensure a required **optimal** level of cooperation with the regulatory authorities and with domestic banks.

These propositions constitute the starting point for our model, which provides a formal analysis of the strategic environment faced by foreign banks and domestic institutions when an emerging economy decides the degree of openness of its financial system. We describe below the ongoing transition process of the Vietnamese economy as a strategic environment to which our formal setting can be applied.

3.1 The evolution of the Vietnamese financial market

As a case study reflecting the propositions described above we consider the evolution of the Vietnamese financial sector in its transition toward an open international market structure. The transition of the Vietnamese economy has received particular attention when considering the financial evolution of the Asian-Pacific region, see International Monetary Fund (2012) and Bhattacharya (2013).

The emergence of the Vietnamese economy as a market economy may be traced to the reforms of the mid 1980s. In the initial set of reforms commercial banking was separated from central banking, which previously had control of sectoral credit allocation, by the formation of state-owned commercial banks with control of sectoral credit allocation. The central bank focussed on regulation thereafter. Therefore, while this was a step toward modernizing the banking system and making the allocation of capital more efficient it was still under state control. This was only a makeshift reform as the Asian financial crisis was later to expose. The government announced in 1999 that the "*Doi Moi*" that produced such economic growth in the late 1980s and early 1990s should be model. As a result, incentives for a private sector action program to reform and restart the economy and the inclusion of banking reforms were considered a matter of importance.

In a 2002 survey on foreign direct investment in Vietnam by the Multilateral Investment Guarantee Agency, the most important factors considered very influential in deciding the location of foreign direct investment are access to customers, cited by 77 percent of respondents, stable social and political environment cited by 64 percent and ease of doing business cited by 54 percent. Respondents also stated in response to the effects of the Bilateral Trade Agreement of 2001 with the USA that improved transparency, the elimination of discrimination, and reducing bureaucracy in licensing were those considered to having the most positive effect in attracting foreign direct investment at 69, 66 and 63 percent, respectively. Membership of the WTO was also ranked among the highest as the measure that would improve the attractiveness of investing in Vietnam (Data retrieved from Foreign Investment Agency of the Ministry of Planning and Investment and the US Agency for International Development (2005)). Clearly, (*P1*), there were strong motivating factors for financial sector reform prior to Vietnam's WTO membership in 2007.

According to The Banker (2008) and the International Finance Corporation (2008), foreign banks' branches had a market share of 8 percent of loans and 13 percent of deposits in 2007 and represented 10 percent of total banking assets. They focussed on foreign firms and individuals as well as high net worth domestic individuals and intended to offer investment banking services, (*P2*). However, according to The Banker (2008), in the short to medium term, that is ten years, it was unlikely that foreign banks would have more than 15 percent of the retail banking market due to the government restrictions and also their own strategies in terms of customer base. Moreover, the Vietnamese banks are expected to compete for a share of the market as the financial system deepens and they adapt to maintain and expand their customer base, see Phan and Ghantous (2013).

Prior to 2007 foreign banks were prohibited to operate wholly owned subsidiaries. Due to Vietnam's commitments under WTO accession there was a decision in 2007 to allow foreign banks that were already established in Vietnam to incorporate in Vietnam. The government legislated for wholly owned foreign banks headquartered and incorporated in Vietnam as a limited liability bank, with specified banking business aims and roles, and with a 99 year license to operate. According to The

Banker (2007), *P3*), there were 24 foreign banks competing for this privilege which further illustrates the perception of banks to the potential opportunities available. However, only five banks were awarded licenses to incorporate as wholly owned foreign banks.

In addition to domestic banks, there were 33 branches of foreign banks in Vietnam as of 2010, all of whose licenses were issued in the 1990s and 2000s, and 54 representative offices of foreign banks, all of whose licenses were issued in the 2000s, see World Bank (2010). There were five Joint Stock Banks with strategic foreign investors that account for 13 percent of total assets according to data from the State Bank of Vietnam (2010) and World Bank (2009). Foreign investors, including banks, were restricted in investing in domestic banks. A single investor could not hold more than 15 percent of equity and a group of investors no more than 30 percent, see Federal Reserve Bank of San Francisco, Country Analysis Unit (2011). However, while these limits were set by the government, (*P4*), domestic banks might also prefer to allow foreign banks invest at a lower limit.

The economic and financial transition strategy of the Vietnamese government has generated a substantial amount of inflation, see Bhattacharya (2013), together with a considerable increase in its stock market capitalization and turnover ratios, see figure 5 in International Monetary Fund (2012, p. 14). The rapid deepening of the Vietnamese financial system makes it vulnerable to credit and asset price booms, see International Monetary Fund (2012, p. 17). This type of evolution, and its consequences for the control and stability of the domestic monetary policy, is what may motivate countries like China to maintain a closed and highly supervised financial system, see Obstfeld (2007). Moreover, recent studies such as Beck *et al.* (2013) obtain a negative correlation between economic stability and financial openness (market power) for China, though positive for Vietnam.

4. Modeling strategic interactions within an international business environment

The strategic environment described in the previous section is common to the international business branch of the economic literature. Despite this fact, the formal modelization of this type of decision theoretical scenarios has been considerably delayed until Sanna-Randaccio and Veugelers (2007). These authors introduce a partial equilibrium entry game based on the demand for a given technological product in the foreign and domestic economies. However, only the strategic behaviour of foreign entrants, in this case firms, is specifically modeled, with domestic firms agreeing *de facto* to the entry of technologically superior entrants. Foreign investors must consider the information spillovers that may be absorbed by domestic – initially underdeveloped – competitors and potentially used against them as the domestic firms develop technologically. Governments, particularly in underdeveloped countries, may afterwards expel foreign entrants from the country while keeping the technology acquired. Tangent to this idea is that of Parente and Prescott (1994), whose governments exhibit sufficient monopolistic power so as to block foreign incursions in their domestic economies.

The current formal setting must consider specifically the strategic interactions taking place between domestic institutions and foreign investors and does so within a Bayesian signaling framework. The game-theoretical literature on Bayesian signaling has mainly evolved toward the formal analysis of equilibrium refinements, see Cartwright and Wooders (2009), and dynamic stability, see Gerardia and Myerson (2007),

and remains foreign to the requirements imposed by international business-based environments. That is, the prescriptive approach that follows from real life events distorts the limits and constraints imposed by the pure theoretical approach followed by formal theory.

Similarly, the industrial organization literature dealing with foreign direct investment tends to concentrate on the interactions among competitors within a given market for different quotas or its total monopolistic control, see Mukherjee and Ramani (2011). In the current setting, players do not only compete for the control of the financial market but the resulting equilibria extend to the control over the entire domestic economy. Domestic institutions exert initially complete control over an economy that may be lost to foreign investors. That is, even though the domestic financial market may be divided between foreign and domestic banks, the control over the money supply of the country constitutes a fundamental outcome of the signaling entry game.

When dealing with equilibrium stability, it is intuitively clear that both domestic and foreign players may default after an initial equilibrium agreement is reached. However, when trying to do so both players are constrained by exogenous market forces, which shift the model away from a standard equilibrium enforcement approach, see Caron and Lafay (2008). That is, if the government decides to restrict its level of cooperation, the openness of the financial system to the global economy prevents a total closing from being imposed. Unlike the trade literature on international business, monetary flows cannot be domestically contained unless the system is fully closed, see, for example, Chari and Kehoe (2003). Similarly, if foreign banks decide to default and follow a more aggressive entry policy, domestic regulators could temporarily block financial market flows, limiting the liquidity capacity of foreign banks, which constitutes a shock that may have further uncontrollable effects in the current globalized financial market.

Thus, the characteristics defining the standard Bayesian signaling approach differ from those of the market setting on which foreign entrants and domestic institutions interact. The international financial market imposes exogenous pre-commitment constraints and limits the ability of players to enforce their default strategies. This also leads to substantial differences with the standard international business literature, where capital and knowledge cannot be as easily transferred as in the case of banks, which interact within a particularly volatile market.

5. The proposed game-theoretical model

5.1 The signaling entry game: preliminaries

A game-theoretical model is developed based on the previous behavioral propositions in order to analyze the optimality of the limiting entry strategy followed by a given domestic institutional sector when considering the entry applications of foreign banks in the domestic financial system. The model analyzes the strategic scenario faced by a developing country with a relatively underdeveloped banking system when deciding whether or not and to what extent allow for the entrance of better reputed and more technologically advanced foreign banks in its domestic financial system. Foreign banks, at the same time, may signal either truthfully or not their intention to cooperate up to a certain level with the domestic authorities in the development of the domestic financial system.

The strategic entry framework defined is therefore based on the cooperation level chosen by highly reputed foreign banks, denoted by $\alpha \in [0, 1]$, and the degree of

openness of the domestic financial system imposed by regulatory institutions, denoted by δ, given the signals issued by foreign banks. The degree of openness chosen by the domestic regulatory institutions consists of a set of policies limiting the activities of foreign banks in the domestic financial market. Following the example of the Vietnamese economy described above, these policies consist mainly of capital regulation and activity restrictions, such as the limit to the participation of foreign banks in Vietnamese banks and the prohibition to operate wholly owned subsidiaries. Moreover, considering the evolution of the Vietnamese financial market, the limits imposed should be relaxed as the financial deepening of the country progresses and foreign banks become more integrated in the domestic economy.

There are three different forms of entry. First, foreign banks may open representative offices and branches with the permission of the domestic central bank. Second, alternatively, foreign banks may acquire a stake in a domestic bank through direct negotiation subject to restrictions imposed by the regulator. Finally, foreign banks may apply for a license to open a fully owned subsidiary although the number of these licenses is generally limited.

Regulatory institutions, both political and financial, are aware of the direct benefits derived from the progressive integration of highly developed foreign banks within the domestic financial system (*P1*). For example, an empirical dependence relation between institutional development and economic recovery has been identified by Piñeiro Chousa *et al.* (2005). In the same way, foreign banks are aware of the potential benefits derived from gaining access to the financial sector of a developing economy (*P1*). At the same time, as the degree of openness increases, domestic banks would face an immediate increase in competition, see Claessens *et al.* (2001), while the ability of regulatory institutions to control and contain information flows would progressively decrease (*P2* and *P3*). That is, the control exerted by the domestic government over the financial monitoring activities and subsequent information flows will be weakened as the financial system is opened to the global economy, see Gao and Kling (2006) and Barth *et al.* (2008), with the former ones concentrating on the continuously analyzed Chinese financial market. The loss of monopoly power that follows from market liberalization and its relation to subsequent banking crises have been empirically verified by Noy (2004). The severity of these drawbacks depends on the unknown α level of cooperation (expected to be) displayed by foreign banks. Besides, the provision of deposit insurance, either total or partial, a form of control exercised by the government through its central bank, would be severely limited. In this regard, Brezigar-Masten *et al.* (2008) in a study of transition economies state that the positive effects on growth of financial market development are non-linear and that in order for financial integration to have a positive effect on growth the development of financial markets and institutions must be above a certain threshold.

Foreign banks face a similar trade-off when deciding their level of cooperation and knowledge transfers with domestic banks and institutions due to the unknown evolution of the δ openness variable (*P3* and *P4*). Thus, the α cooperation value chosen by highly reputed foreign banks is determined by the expected evolution of domestic openness conditions. Note that foreign banks decide their strategy to enter the domestic banking market and that this entry request constitutes a signal. Depending on the foreign banks' strategy and the type of operations, their entry signal elicits a response from the regulator. For the purposes of this paper all foreign banks that meet the requirements for entry are considered equal, i.e. the legal environment of the domestic economy is binding and all foreign banks are equally constrained by it.

However, this constraint does not imply that all foreign banks can be assumed to have the same entry strategy. Moreover, if the domestic authorities were able to discriminate among foreign banks, i.e. define a separating Bayesian equilibrium, they would impose different restrictions either officially or unofficially depending on the characteristics of the potential entrants. We provide additional intuition on the capacity of domestic authorities to differentiate among foreign applicants in Section 6, where the subject of corruption and its effects are also considered. It should be noted that the main features of the model described in Section 5 would remain unchanged. However, item (3) in Subsection 5.2 would not need to be imposed, since domestic authorities would not be forced into a pooling equilibrium.

The above strategic entry structure is defined below from a game-theoretical perspective and its corresponding equilibria derived. Moreover, we will illustrate how the behavioural propositions described in Section 3 are reflected in the respective outcomes obtained.

5.2 The signaling entry game: strategies, signals, probabilities and payoffs

The signaling entry game results from comparing the payoffs obtained under different possible entry scenarios with those prevailing in a closed financial system. Note that the payoff values defining the entry game have been chosen to provide a reference framework on which to analyze the strategic environment described in the previous sections. The formal analysis of the model would remain unchanged if these values were modified. In this regard, Subsection 5.5 allows for the payoff values to be modified and describes the resulting equilibria.

The closed economy payoff matrix derived from an autarkic system where domestic banks stand as the sole financial intermediaries in the economy is defined as:

	Foreign Banks
Regulatory Institutions	$\Xi,\quad 0$

Foreign banks are not allowed to participate in the domestic financial system, obtaining a payoff of zero. On the other hand, regulatory institutions, both political and financial, manage a closed controlled financial system, receiving a reference payoff of Ξ.

Consider now the non-cooperative payoff matrix corresponding to the scenario where foreign banks enter the domestic economy but do not cooperate with the lesser reputed domestic ones and take control over the financial system by choosing a value of $\alpha = 0$:

	Foreign Banks
Regulatory Institutions	$0,\quad \Phi$

Given the entry request made by foreign banks, the non-cooperative entry setting takes place with probability ϖ. The variable $\Phi > 0$ defines the benefits obtained by foreign banks as the sole oligopolistic structure in the economy. The entrance of zero accounts in part for the loss suffered by domestic banks as depositors shift funds to the highly reputed foreign ones. That is, as illustrated by Claessens *et al.* (2001), the

benefits of both domestic and foreign banks decrease with competition and increase with the number of depositors. This entrance also reflects the disutility caused on regulatory institutions by the loss of control over both the financial system and the monetary policy, the risk of default by foreign banks if global conditions worsen, and the disappearance of the power structure existing prior to the entrance of foreign banks.

The totally cooperative entry payoff matrix corresponding to the entry scenario where foreign banks choose a value of $\alpha = 1$ and cooperate totally with the lesser reputed domestic ones and the regulatory institutions is given by:

	Foreign Banks
Regulatory Institutions	$\Xi^* > \Xi, \quad << \Phi$

Given the entry request made by foreign banks, the totally cooperative entry setting takes place with probability θ. Note that we have implicitly assumed that the loss suffered by regulatory institutions in terms of control exerted over the financial system is more than compensated by the knowledge and technology spillovers obtained from totally cooperative foreign banks. Such an assumption justifies the $\Xi^* > \Xi$ payoff received by regulatory institutions within this framework. We modify this assumption in item (3) of Subsection 5.5. Foreign banks obtain a payoff of $\ll \Phi$ due to the decreasing relationship existing between bank benefits and competition, see Claessens *et al.* (2001).

Finally, if foreign banks cooperate partially with the lesser reputed domestic ones and institutions by choosing a value of α located within the interval defined by the two previous levels and taking partial control over the financial system, the following partially cooperative entry payoff matrix is obtained:

	Foreign Banks
Regulatory Institutions	$(0, \Xi^*), \quad < \Phi$

Given the entry request made by foreign banks, the partially cooperative entry setting takes place with probability $\eta = 1 - \varpi - \theta$. The relative payoffs $(0, \Xi^*)$ and $< \Phi$ are assumed to be bounded within the limit values defined by the totally and non-cooperative entry scenarios. It should be noted that the totally cooperative setting could easily lead to a lower welfare level among depositors than the partially cooperative one. This would be the case if highly inefficient lesser reputed banks that are only able to operate within the protected environment of a controlled financial system were preserved under total foreign cooperation. We are, however, considering the loss of control over the financial system faced by regulatory institutions when defining the corresponding matrix payoffs. The strategic environment and the equilibrium that result from allowing for a $(0, > \Xi^*)$ payoff entry will be discussed in Subsection 5.5. In addition, note that there exist as many partially cooperative payoff matrices as possible $\alpha \in (0, 1)$ values that may be chosen by foreign banks. For expositional simplicity and without loss of generality, we will consider two representative payoffs matrices derived from this scenario, which will be identified by their corresponding minus and plus indexes.

Foreign banks must interact with domestic institutions for the control of the money supply and with domestic banks for the control of depositors. Clearly, different types of banks with different entry strategies and signals issued will apply simultaneously. The sequence of events defining the strategic interactions among the main actors that determine the subsequent entry game follows:

(1) Banks composing the set of potential foreign entrants present each a different entry plan based on a proposed cooperation level, $\sigma_i \in [0, 1]$, $i = 1, \ldots, n$, given their requested entry mode(s). This suggested cooperation level constitutes the signal sent by each potential foreign entrant. Clearly, a relationship exists between the banks' types and the signals sent, given their interests in different sectors of the domestic financial market and future strategic plans. In particular, consider the foreign bank i. When issuing a signal, $\sigma_i(\alpha_i \mid \tau_i)$, with τ_i referring to the foreign bank type, the foreign bank is maximizing its entry strategy. The type of foreign bank may be defined in terms of its willingness and capacity to cooperate and range from null to absolute, with τ taking integer values in a respective zero to ten scale. That is, $\sigma_i(\alpha_i \mid \tau_i)$ is the result of the entry strategy maximization of foreign banks in the domestic market. Given the initial beliefs of the domestic authorities, which are generally assumed to be common knowledge, foreign banks propose a set of cooperation policies that can be summarized by the entry cooperation level α_i for an expected optimal δ^* defined in item (5) below. For example, domestic authorities are aware of the previous and current activities of potential foreign entrants in other countries, which allows them to form subjective beliefs so as to the type of cooperative behaviour expected from each foreign bank. At the same time, foreign banks know that domestic authorities have formed some expectation based on the public information available.

The signal sent by foreign banks constitutes their optimal entry strategy given δ^*. Domestic authorities have two possible options when calculating δ^*. On one hand, they can apply a max min criterion to the expected payoffs derived from the updated beliefs regarding foreign banks. On the other, they can consider the Bayesian updated types of foreign applicants and the number of banks composing each group type and maximize the resulting expected payoff. Indeed, domestic authorities may perform both operations and choose the one leading to the highest expected payoff.

(2) After observing all signals and evaluating each and every potential entrant, domestic authorities generate a set of updated type profiles for each and every bank based on their subjective beliefs. Each profile assigns a probability function to each bank defined on the set of possible types. These posterior beliefs will eventually lead to the $(\varpi, \eta_-, \eta^+, \theta)$ tuple defined by domestic institutions. Thus, depending on how we want to define the maximization problem, each $\sigma_i(\alpha_i \mid \tau_i)$ can be defined and interpreted in two different ways:

- First, as a $(\varpi, \eta_-, \eta^+, \theta)_i$ tuple for each bank i. The domestic authorities may decide to maximize the minimum expected payoff or to aggregate along bank types and generate an average expected bank calculating the resulting expected payoffs.
- The other option is that domestic authorities have no previous information or beliefs about foreign banks and assign a type to each applicant based on

the $\sigma_i(\alpha_i \mid \tau_i)$ signal, defined in this case as a degenerate probability function per bank. Then the same maximization operations described above may be performed by the domestic authorities.

Note that foreign banks perform the same calculations before issuing their respective signals. Note also that foreign banks may have privileged information regarding the type of the other foreign banks due to their previous interactions in the international financial markets. If this were not the case, an interesting extension of the game would arise, where foreign banks must also generate expectations on the type of other banks when calculating their optimal strategies.

(3) Domestic authorities cannot initially discriminate against any foreign bank as all laws must apply equally to all of them. Thus, they must choose a given representative profile and behave optimally according to it. Note that this is the case even if all banks report truthfully in an initial separating equilibrium setting. This "imposed pooling" is due to the regulatory constraints that force all entrants to be treated equally. Note, however, that regulatory constraints are official statements and other type of unofficial agreements may also be considered.

(4) Domestic authorities choose the $(\varpi, \eta_-, \eta^+, \theta)$ profile determining the δ level of openness of the domestic economy. The profile may be chosen by either maximizing the lowest expected payoff E[locpay(δ)], i.e. a standard max min approach, or generating a weighted average profile based on the domestic beliefs and resulting expected proportions of different bank types. Other decision alternatives may also be considered and all foreign banks must be treated equally in each case.

(5) Given the beliefs of domestic authorities regarding the set of possible foreign bank types, i.e. given the $(\varpi, \eta_-, \eta^+, \theta)$ tuple defined by the domestic institutions, an optimal δ^* openness level is chosen that constitutes the Bayesian equilibrium of the corresponding entry game.

(6) Foreign investors interact with domestic banks based on the δ^* restrictions imposed by the domestic authorities, the mode of entry chosen and the segment(s) of the domestic financial markets under consideration. Note that there are two different games being played depending on the type of entry mode under consideration, as we will explain in Subsection 5.6. Moreover, as will be emphasized in that subsection, domestic authorities, having an information advantage regarding the characteristics of domestic banks, may consider the payoffs of the latter ones when defining their optimal strategy.

In order to simplify notation and the presentation, the Bayesian updating process determining the beliefs of the domestic authorities has been omitted. The paper remains self-contained and the results unchanged, since the main focus of the current model is not the beliefs formation process of domestic institutions, though this topic should constitute an immediate extension of the strategic environment under consideration. The standard textbook approach to Bayesian signaling games can be found in Section 8.2 of Fudenberg and Tirole (1991).

5.3 The signaling entry game: equilibrium

The signaling entry game defined in the paper constitutes a simplified limit version of the higher dimensional game considered by foreign banks and regulatory institutions.

To see why this is the case, note that foreign banks may choose any cooperation level, a variable that defines their type, within the interval [0, 1]. The set of foreign bank types ranges therefore from non-cooperative entrants, $\alpha = 0$, to totally cooperative ones, $\alpha = 1$. Moreover, the set of foreign bank types is assumed to be a countable infinite subset of [0, 1].

In order for foreign banks to request entry in the domestic economy, such an action must constitute an optimal strategy given their type, $\alpha \in [0, 1]$, and the strategy profile assigned to regulatory institutions. Then, given the entry request made by foreign banks, which acts as a signal on their type, and the beliefs held regarding the set of foreign bank types, embedded within the $(\varpi, \eta_-, \eta^+, \theta)$ tuple, regulatory institutions choose an optimal degree of openness that ranges within the $[\delta_0, \delta^0]$ interval. In this case, δ_0 refers to a closed autarkic system, while δ^0 stands for a completely open one.

It should be emphasized that, even though the set of foreign banks may be composed by banks of different types, regulatory institutions cannot impose a discriminative individual entry policy when designing their opening strategy. That is, all foreign banks must be treated equally if allowed to enter the domestic financial system. Thus, the optimal value of δ must be defined for the expected level of α calculated through the (Bayesian) updated tuple $(\varpi, \eta_-, \eta^+, \theta)$.

The signaling entry game illustrating the strategic entry scenario faced by foreign banks and regulatory institutions for a given (η_-, η^+, θ) triple, with $\varpi = 1 - \eta_- - \eta^+ - \theta$, is therefore given in Table I.

Note that there exist as many η values as possible partially cooperative foreign bank types. A similar observation applies to the set of possible δ values that may be chosen by regulatory institutions. We concentrate our analysis on the choice of an optimal δ value by regulatory institutions given their (probabilistic) beliefs regarding the type of foreign banks, reflected in the (η_-, η^+, θ) triple. Thus, an entry game and a corresponding equilibrium δ must be defined by regulatory institutions for each possible (η_-, η^+, θ) triple. Clearly, there are infinitely many possible entry games.

The payoffs received by foreign banks depend negatively on their degree of cooperation, with $0 < \alpha_- < \alpha^+ < 1$, for any given $\delta > \delta_0$, and positively on the degree of openness of the domestic financial system. That is, as the ownership advantages reflected in *P1* indicate, the higher the degree of cooperation of foreign banks the larger the amount of knowledge and technological resources they provide domestic banks with for a given level of openness. At the same time, domestic location advantages imply that the lower the restrictions imposed by regulatory institutions the easier the access of foreign banks to additional unexploited segments of the domestic market. Note that we have not included several foreign banks' payoff entrances in the entry game matrix. This has been done in order to simplify the presentation of the game and focus attention on domestic strategies.

Consider now the payoffs received by regulatory institutions as a function of both α and δ. Domestic payoffs increase in α due to the larger amount of knowledge and

Table I.
Entry game for a given (η_-, η^+, θ) triple

	Non-cooperative	Partial-cooperative (α_-)	Partial-cooperative (α^+)	Total-cooperative
Open (δ^0)	$0, \Phi$	$(0, \Xi), \leqslant \Phi$	$(\Xi, \Xi^*), < \Phi$	$\Xi^* > \Xi, \ll \Phi$
Partial-open (δ^+)	$\ll \Xi, \bullet$	$\leqslant \leqslant \Xi, \bullet$	$\geqslant \geqslant \Xi, \bullet$	$\gg \Xi, \bullet$
Partial-open (δ_-)	$< \Xi, \bullet$	$\leqslant \Xi, \bullet$	$\geqslant \Xi, \bullet$	$> \Xi, \bullet$
Close (δ_0)	$\Xi, 0$	$\Xi, 0$	$\Xi, 0$	$\Xi, 0$

technology transfers received from foreign banks for higher cooperation levels. Similarly, domestic payoffs decrease in δ for relatively low levels of cooperation due to the increasingly easier access obtained by foreign banks in exchange for relatively low transfers provided to domestic banks and institutions. The same type of reasoning implies that domestic payoffs increase in δ for relatively high α values. These payoff constraints follow from the competitive advantage exhibited by foreign banks relative to the domestic ones and summarized in *P2*.

Note that the payoffs received by regulatory institutions in the partial-cooperative (α^+) and total-cooperative cases could be $>\Xi$ for relatively low δ values. This would be the case if, for example, there were scale economies in the technology and knowledge transferred that require a minimum level of control by foreign banks to be efficiently exploited. Besides, the (possible) existence of geographical knowledge spillovers would imply that domestic gains increase as foreign banks access additional underdeveloped sectors of the domestic financial system.

We define now the perfect Bayesian equilibrium of the signaling entry game described above. To do so, we must first assume that all the δ-based domestic payoff functions defined for each possible α value, non-cooperative (δ), partial-cooperative ($\delta \mid \alpha_-$), partial-cooperative ($\delta \mid \alpha^+$), and total-cooperative (δ), are continuous in δ. Note also that the sum of continuous real functions is continuous.

Given the type of entry requests made by foreign banks, the set of domestic posterior beliefs defined by the $(\varpi, \eta_-, \eta^+, \theta)$ tuple, and the set {non-cooperative(δ), partial-cooperative ($\delta \mid \eta_-$), partial-cooperative ($\delta \mid \eta^+$), total-cooperative(δ)} of δ-based domestic payoff functions, a perfect Bayesian equilibrium of the corresponding entry game is a value of δ that maximizes the expected payoff obtained by regulatory institutions:

$$E[\text{loc pay}(\delta)] = \varpi \,\text{non coop}\,(\delta) + \eta_- \,\text{part coop}(\delta|\eta_-) + \eta^+ \,\text{part coop}\,(\delta|\eta^+) + \theta \,\text{total coop}\,(\delta) \tag{1}$$

We denote a perfect Bayesian equilibrium of the entry game defined for a given (η_-, η^+, θ) triple by δ^*, i.e. $\delta^* \in \arg\max E[\text{loc pay}(\delta)]$. The existence of at least one perfect Bayesian equilibrium within the interval $[\delta_0, \delta^0]$ follows directly from Weierstrass theorem. Note, however, that uniqueness cannot be guaranteed since it depends on the shape of the δ-based domestic payoff functions. In other words, there may exist two or more different δ^* values providing regulatory institutions with the same E[locpay(δ)] for a given entry game. We deal with this problem below. In the meantime, assume that δ^* is unique.

Consider the value of $\delta^* \in \arg\max_\delta E[\text{loc pay}(\delta)]$defined for a given $(\varpi, \eta_-, \eta^+, \theta)$ tuple and the set {non-cooperative (δ), partial-cooperative ($\delta \mid \eta_-$), partial-cooperative ($\delta \mid \eta^+$), total-cooperative(δ)} of δ-based domestic payoff functions.

Assume that domestic payoff conditions improve, i.e. the set of δ-based domestic payoff functions becomes {non-cooperative(δ), partial-cooperative($\delta \mid \eta_-$), partial-cooperative($\delta \mid \eta^+$), total coop$'(\delta)$}, with total coop$'(\delta) >$ total-cooperative (δ), $\forall \delta \in [\delta_0, \delta^0]$. We require the differential of the new expected payoff function E[locpay$'(\delta)$] to be strictly positive at the current δ^*:

$$\left.\frac{d\,E[\text{loc pay}'(\delta)]}{d\,\delta}\right|_{\delta=\delta^*} = \left[\varpi \frac{\partial \,\text{non coop}(\delta)}{\partial\,\delta} + \eta_- \frac{\partial \,\text{part coop}(\delta|\eta_-)}{\partial\,\delta} + \eta^+ \frac{\partial \,\textit{part}\, \text{coop}(\delta|\eta^+)}{\partial\,\delta} + \theta \frac{\partial \,\text{total coop}'(\delta)}{\partial\,\delta}\right]_{\delta=\delta^*} > 0 \tag{2}$$

Similarly, relative increments in the probability of cooperation for a given set of δ-based domestic payoff functions, i.e. the tuple of posterior beliefs becomes $(\varpi', \eta_{-}, \eta^{+}, \theta')$ with $\varpi' > \varpi$ and $\theta' > \theta$, are required to provide a strictly positive differential of the corresponding new expected payoff function at the current δ^*. Note that, in this case, the envelope theorem must be used to obtain the respective differential values.

Thus, following *P3* and *P4*, improvements in domestic payoff conditions and cooperation probabilities have been assumed to generate expected payoff functions that are strictly increasing in the current δ^* value. If we additionally assume that the new expected payoff functions generated by any of the previous improvements have no maximum for any $\delta > \delta^*$, then we can guarantee that any initially chosen δ^* converges to δ^0 as domestic payoff conditions improve or cooperation probabilities increase. Both assumptions will allow us to deal also with the multiplicity of equilibria problem.

Consider the first entry game being played within a setting of multi-stage signaling entry games. If the game has a unique perfect Bayesian equilibrium, i.e. $\delta^* < \delta^0$, the above assumptions guarantee that as domestic payoff conditions improve or cooperation probabilities increase the perfect Bayesian equilibria defined for the corresponding set of continuation entry games converge to δ^0; see Section 8.2.3 in Fudenberg and Tirole (1991) for additional formal details regarding multi-stage signaling games.

On the other hand, assume that the first entry game being played has several perfect Bayesian equilibria. Regulatory institutions are indifferent among these equilibria since all of them provide the same E[locpay(δ)]. Therefore, regulatory institutions must select one equilibrium δ value randomly. Given this initially chosen δ^*, the above assumptions guarantee that, independently of the number of perfect Bayesian equilibria defined for each continuation entry game, as domestic payoff conditions improve or cooperation probabilities increase the corresponding set of perfect Bayesian equilibria chosen by regulatory institutions converges to δ^0.

It must be emphasized that the above structural assumptions, which follow directly from the Propositions defined in the third section, have been imposed due to the generality of the framework under consideration, which would otherwise allow for E[locpay(δ)] to take any shape as payoffs and probabilities change. In addition, the above assumptions provide dynamic consistency to the behavior of perfect Bayesian equilibria through the set of continuation games.

Finally, given the set of structural assumptions introduced through this section, we can easily define a surjection (two different entry games may have the same perfect Bayesian equilibrium but a unique equilibrium must be chosen by regulatory institutions per entry game) between the set of (η^*, θ^*) pairs defined in the simplified version of the entry game introduced below and that of perfect Bayesian equilibria of its extended counterpart described in the current subsection for every possible set of δ-based domestic payoff functions.

5.4 The signaling entry game: numerical representations

When considering a prescriptive approach like formally modeling strategic interactions between countries and financial institutions in international business, results should be presented in a sufficiently simple way so as to allow for direct inferences regarding policy implications. This should be done without compromising the formality of the analysis presented. In this regard, the game introduced through this subsection is a simplified version of the actual entry game taking place between

domestic regulatory institutions and foreign banks presented in the previous one, The game below does, however, provide a much more intuitive presentation of the results. Thus, this more intuitive presentation will be maintained through the remaining of the paper, while keeping in mind that it does not compromise the main results obtained. It should be noted that only the entry game taking place between domestic regulatory institutions and foreign banks is analyzed here. The games played by foreign and domestic banks both in the direct and portfolio investment instances are presented in Subsection 5.6, where it is illustrated how their respective equilibria are determined by the strategies of regulatory institutions.

The signaling entry game considered results from merging the payoff matrices described in Subsection 5.2 into Table II.

As already stated, given the different entry requests made by foreign banks, which are considered to be signals about their strategic behavior, regulatory institutions update their subjective beliefs regarding the set of possible entry scenarios and decide whether or not to open the domestic financial system. It could be easily proven that a cooperation probability pair (η^*, θ^*) allowing for a Bayesian equilibrium with entry exists. Once again, (η^*, θ^*) represents a pair of updated beliefs and all entry scenarios have been defined in terms of Bayesian updated beliefs, i.e. ϖ, θ and η. It immediately follows that:

Theorem 1. Given an entry request made by foreign banks, there exists a (η^*, θ^*) pair such that for any $(\eta^*, \theta^* > \theta^*)$, $(\eta > \eta^*, \theta^*)$, or both, the perfect Bayesian equilibrium of the signaling entry game entails opening the domestic financial system. The value of η^* depends on the domestic payoff obtained in the partially cooperative setting, which ranges within the $(0, \Xi^*)$ interval.

In addition, regulatory institutions could implement entry restrictions that support the (open, partial-cooperative) (depending on the domestic payoff obtained) and the (open, total-cooperative) equilibria, preventing foreign banks from (completely) abandoning their (imposed) cooperative strategies. For this to be the case, a partially open system in which foreign banks are allowed to participate but are also constrained in their financial activities and acquisition capabilities should be observed.

We present now three basic numerical examples illustrating the existence, uniqueness and convergent/divergent behavior of perfect Bayesian equilibria for different sets of δ-based domestic payoff functions and posterior beliefs. These simulations provide an intuitive link between the current simplified version of the entry game and its extended counterpart described in the previous subsection. At the same time, the strategic interactions described in *P1-4* and their effect on the corresponding δ^* values will be illustrated through these numerical simulations. The parameter values and functions used in the simulations as well as the resulting equilibrium δ^* values are summarized in Table III.

	Non-cooperative	Partial-cooperative	Total-cooperative
Open	$0, \Phi$	$(0, \Xi^*), < \Phi$	$\Xi^* > \Xi, \ll \Phi$
Close	$\Xi, 0$	$\Xi, 0$	$\Xi, 0$

Table II.
Entry game

Table III.
Numerical parameter and functional values: changes in payoffs and probabilities

Parameter and functional values	Initial entry setting	Increase in partial-cooperative payoffs	Increase in partial-cooperative probability	Decrease in non-cooperative payoffs
Non-cooperative (δ)	$-\delta^2$	$-\delta^2$	$-\delta^2$	$-\delta^{3/2}$
Partial-cooperative ($\delta \mid \eta$)	δ	1.5 δ	δ	δ
Total-cooperative (δ)	δ^2	δ^2	δ^2	δ^2
ϖ	0.5	0.5	0.45	0.5
η	0.3	0.3	0.35	0.3
θ	0.2	0.2	0.2	0.2
δ^*	0.5	0.75	0.7	0.3346

Note: Effects on the value of δ^* from modifying the payoff functions and cooperation probabilities

The same initial entry setting has been assumed in all three scenarios. This basic setting accounts for the interactions described in *P1* and *P2*. That is, foreign banks have superior technological endowments, which provide them with an ownership advantage over domestic banks, which, in the current context, exhibit location advantages. Thus, if foreign banks are cooperative, the expected payoff obtained by regulatory institutions increases in their δ level due to the benefits derived from interacting with foreign banks (*P1*). However, if foreign banks are not cooperative, then this degree of openness turns against domestic interests due to the technological superiority and competitive advantage exhibited by foreign banks (*P2*). The resulting payoff must therefore be negative in the degree of openness in this latter case.

The modifications introduced in each figure illustrate the ability of domestic authorities to adapt to changes in both the payoffs received from foreign banks and their cooperation probabilities. These modifications may result from strategic behavioural changes derived from subsequent financial interactions with domestic banks and institutions. In this regard, Figures 1 and 2 represent a respective increase in the partial cooperative payoffs and probabilities derived from the interaction with foreign banks.

As stated in *P3* and *P4*, foreign banks expect a progressive deregulation if domestic banks and financial institutions develop and are able to extract a higher profit from their interactions with (cooperative) foreign banks (*P3*). This leads to a higher degree of openness (and a lower control over the domestic money supply). The resulting increase in the δ^* value illustrated in Figures 1 and 2 corresponds to this fact. It also introduces the intuition described in (*P4*), according to which domestic institutions try to preserve a given degree of control by not totally exposing their financial system to the international market. In this sense, Figure 3 fully illustrates the idea behind (*P4*). For example, if domestic authorities expect a decrease in non-cooperative payoffs, they will proceed to restrict the access to their economy to foreign banks and the international financial market by choosing a lower δ^* level.

5.5 Alternative entry payoffs

For completeness purposes, the set of equilibria that would be reached if one or more of the payoffs defining the simplified entry game matrix were modified is described in Table IV.

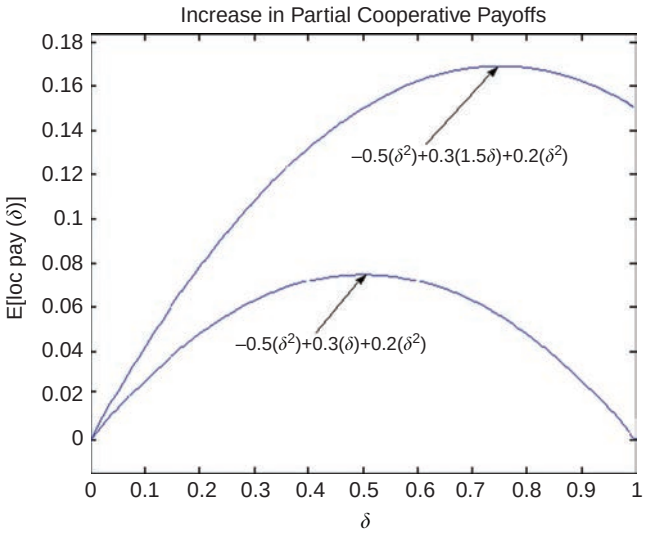

Figure 1.
Effect of an increase in partial cooperative payoffs on the value of δ^*

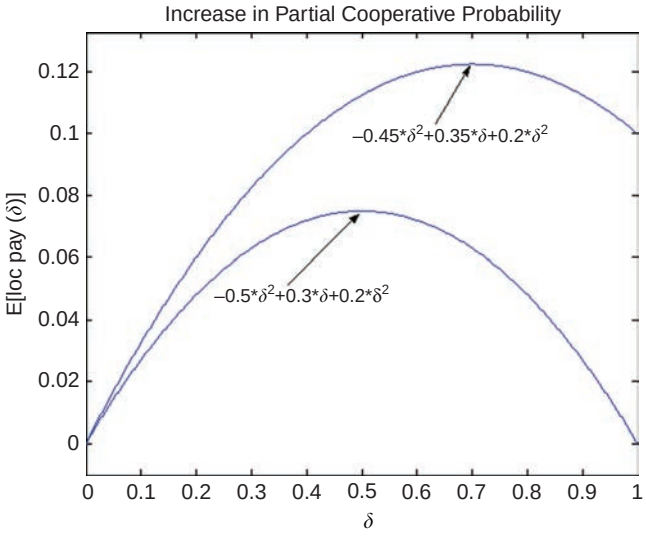

Figure 2.
Effect of an increase in partial cooperative probability on the value of δ^*

Unless specifically indicated, each of these modifications is applied under the assumption that the rest of the entrances defining the simplified entry game matrix remain unchanged. The modifications considered account for almost all the possible open equilibrium payoff variants comparable to a fixed autarkic payoff structure. The remaining possibilities and their corresponding equilibria can be easily inferred from the descriptions made below:

- If the [open, non-cooperative] payoff becomes $(>0, \bullet)$: then, for any given $\varpi > 0$, there exists a low enough payoff received by regulatory institutions, $\underline{p}$, such that for any $p < \underline{p}$, no open equilibrium exists. If $p \in (\underline{p}, 0)$, this modification would result in an increase of the (η^*, θ^*) value required for an open equilibrium to exist.

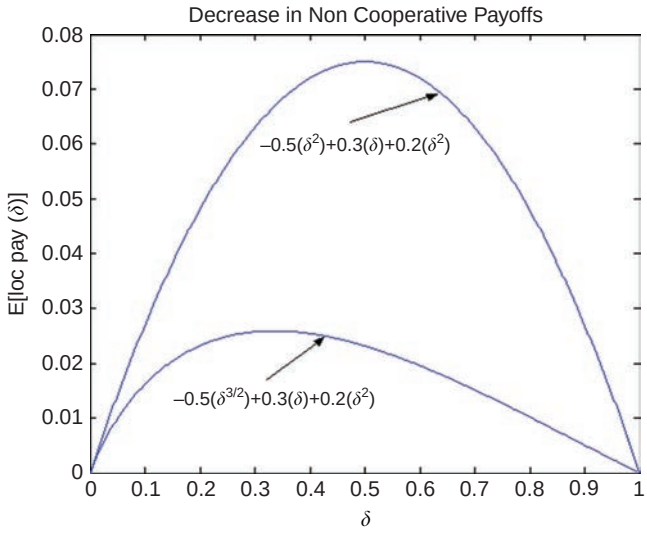

Figure 3.
Effect of a decrease in non-cooperative payoffs on the value of δ^*

Table IV.
Alternative entry game payoffs

	Non-cooperative	Partial-cooperative	Total-cooperative
Open	$<0, \bullet$	$(0, >\Xi^*), \bullet$	$\Xi^* < \Xi, \leqslant 0$

- If the *[open, partial-cooperative]* payoff becomes $((0, >\Xi^*), \bullet)$: then, the set of possible η^* and θ^* combinations that lead to an open equilibrium increases. However, if the (open, total-cooperative) payoff is given by $(\Xi^* > \Xi, \bullet)$, then regulatory institutions would require a large enough value of η in order to open the system. That is, foreign banks would have to take partial control over the relatively underdeveloped domestic financial system with a large enough probability.
- If the (open, total-cooperative) payoff becomes either $(\Xi^* > \Xi, \bullet)$ or $(\bullet, \leqslant 0)$: then, given the (open, partial-cooperative) payoff, $((0, \Xi^*), <\Phi)$, no open equilibrium exists in the former case, $(\Xi^* < \Xi, \bullet)$. Note also that this assumption imposes an upper limit on the degree of openness of the country. That is, opening the financial system completely may imply losses in terms of control over the domestic monetary policy that are higher than the gains derived from knowledge and technology spillovers. In this case, a maximum degree of openness, $\bar{\delta}^*$, would define the open equilibrium of the domestic authorities. Finally, the latter case, $(\bullet, \leqslant 0)$, implies that the totally cooperative entry strategy of foreign banks becomes (weakly) dominated by the other two. Thus, unless the (open, partial-cooperative) payoff is given by $((0, >\Xi), >0)$, no open equilibrium would exist.

5.6 Interacting with domestic banks

Foreign banks play two different entry games when accessing the domestic financial system. The first one involves regulatory institutions and has been carefully analyzed through the previous subsections. In addition, a second game is played between foreign

and domestic banks when competing for the control of the domestic banking system. In this case, the type of game being played depends on whether foreign banks enter the banking system via direct investment or through portfolio investment in domestic banks. We illustrate how both these games are particular cases of the entry game played with regulatory institutions and how the perfect Bayesian equilibrium chosen by regulatory institutions determines their corresponding equilibria.

Consider first the simplified version of the signaling entry game presented in Table V played by a domestic bank i when foreign banks enter the banking system through portfolio investment.

Domestic banks are not necessarily identical and therefore do not need to receive a homogeneous set of payoffs when interacting with foreign banks. As a result, partially and totally cooperative strategies may lead to different payoffs depending on the domestic bank under consideration. Similarly, the cooperative payoffs obtained by foreign banks depend on the domestic banks they interact with, i.e. the payoffs from partial or total cooperation or both could become $> \Phi$.

In any case, the structure of the resulting entry game is identical to the one played by regulatory institutions. Indeed, regulatory institutions could integrate a weighted measure of domestic bank payoffs when defining their own entry game payoffs. Given the respective sets of domestic payoffs and posterior beliefs, each domestic bank i would define its corresponding δ_i^* value. However, the perfect Bayesian equilibrium value chosen by regulatory institutions imposes an upper bound on the portfolio investment strategy of foreign banks that indeed determines the equilibrium of the corresponding Portfolio Investment Entry game for each domestic bank. Thus, unless $\delta^* \geqslant \delta_i^*$, $\forall i$ and through all continuation games the corresponding set of perfect Bayesian equilibria would be suboptimal on an individual bank base.

Consider now the simplified version of the signalling entry game presented in Table VI played by domestic banks when foreign banks enter the banking system via direct investment.

In this case, domestic and foreign banks compete directly for the control of the domestic banking system. The above payoff matrix assumes that foreign banks have an absolute advantage over domestic ones due to their higher level of development (*P1* and *P2*). Competing with foreign banks would only lead to a decrease in the payoffs obtained by domestic banks within a cooperative setting. Therefore, non-competing constitutes a (weakly) dominant strategy for domestic banks.

Once again, the perfect Bayesian equilibrium value chosen by regulatory institutions imposes an upper bound on the direct investment strategy of foreign

	Non-cooperative	Partial-cooperative	Total-cooperative
Open	$0, \Phi$	$(0, \Xi^*)_i, \bullet$	$\Xi_i^* > \Xi_i, \bullet$
Close	$\Xi_i, 0$	$\Xi_i, 0$	$\Xi_i, 0$

Table V. Entry game with a domestic bank: portfolio investment case

	Non-cooperative	Partial-cooperative	Total-cooperative
Non-competing	$0, \bullet$	$(0, \Xi^*), \bullet$	$\Xi^* > \Xi, \bullet$
Competing	$0, \bullet$	$< (0, \Xi^*), \bullet$	$< \Xi^*, \bullet$

Table VI. Entry game with domestic banks: direct investment case

banks. Thus, by limiting the ability of foreign banks to expand through the banking system, regulatory institutions would guarantee a minimum payoff to domestic banks despite their inability to compete with the foreign ones (*P3* and *P4*).

Note that the above matrix represents only one of the three main possible entry scenarios that may take place within the foreign direct investment case, the other two being mergers and acquisitions. The industrial organization literature on international knowledge and technology spillovers provides mixed evidence regarding the final effect that foreign multinationals have on the development of domestic industries; see Sanna-Randaccio and Veugelers (2007) for a literature review and a game-theoretical model where knowledge spillovers occur both from foreign to domestic industries and vice versa. Even though financial intermediaries are barely studied within this branch of the literature, the large amount of mixed evidence presented regarding the effects that technologically advanced foreign entrants have on underdeveloped domestic industries suggests that all possible entry scenarios must be considered. Moreover, the existence of geographical knowledge and technology spillovers may also allow for positive payoffs to be obtained by domestic banks from competing with foreign entrants or lead to an intermediate stage scenario similar to the portfolio investment case. The respective equilibria attained within these alternative entry scenarios and their dependence on the strategies of regulatory institutions can be easily inferred from the previous analysis.

Finally, note that the optimality of the strategies chosen by regulatory institutions and the payoffs received by foreign banks depend on the entry setting under consideration and the spillovers derived from the interactions with domestic banks, respectively.

6. Limitations and managerial implications

The current paper has presented an idealized version of a conflicting strategic signaling entry scenario faced by foreign banks and domestic authorities together with local banks. The presentation remains intuitive and simplifies some real-life characteristics that should be accounted for when suggesting managerial recommendations. Together with the relaxation of the general simplifications imposed on the model, its applicability to all countries would require specific assumptions to account for the heterogeneity of their financial systems, see Beck *et al.* (2013). The most important simplification introduced consists of treating identically all foreign banks requiring entry into the local economy. This is clearly not the case among developing countries, since several types of foreign banks exist and each may provide a different entry signal.

For example, in the Vietnamese economy case, a foreign bank, as a strategic investor, is restricted to a limit of 15 percent of the equity of a domestic bank and a group of banks or other types of investors may not acquire more than 30 percent. There is also the possibility of the limit being increased to 20 percent. HSBC constitutes such an exception, as the Vietnamese government considers it a strategic investor and approved an additional 5 percent purchase of Techcombank in addition to its previous 15 percent stake in the bank. In this regard, foreign banks may be a strategic investor in only one domestic bank and may be represented on the board of only two domestic banks. In 2011 branches of foreign banks were accorded the same treatment as domestic banks for deposit and loan regulation and other banking services, refer to Federal Reserve Bank of San Francisco, Country Analysis Unit (2011) for these and additional data on the banking reform in Vietnam.

Therefore, domestic authorities must decide the δ_i, with $i = 1, \ldots, n$, openness (or constraint) level that they apply to each foreign bank either officially or unofficially. In this sense, we would be dealing with a n-persons non-cooperative entry environment. This extension would both enrich and complicate the paper considerably. However, several plausible strategies for domestic authorities and foreign banks may be intuitively provided here, defining potential extensions of our model.

First of all, foreign banks should indicate their type not only through an entry request as in the current paper, but given the level of cooperation expected to be obtained from domestic authorities. Note that foreign banks may misrepresent their types in order to try to obtain larger entry benefits from lower institutional barriers. The strategies of foreign banks should therefore extend those described in (i) within Subsection 5.2 to account for their beliefs on the evolution of domestic authorities, i.e. the expected type of institutional behavior. Given the signal issued by a foreign bank and the expectations of domestic authorities on its type and beliefs (about the behavior of domestic authorities), we can define a perfect Bayesian equilibrium between the domestic authorities and the set of foreign banks. If a separating equilibrium cannot be defined, a max min strategy or a weighted average profile of foreign banks could be defined by the domestic authorities, extending those described in (iv) within Subsection 5.2. In this regard, the domestic institutions face three different scenarios determined by their own evolution and strategies, and the contestability existing among foreign banks:

(1) Besides maximizing their minimum possible payoff by choosing the most restrictive entry level based on the expected type of banks applying, domestic authorities may grant different restrictions to different types of foreign banks. However, when doing so, they must consider the probability of coalitions taking place between cooperative and non-cooperative banks. Allocating a higher δ value to the cooperative type allows also for a higher δ value for the non-cooperative banks, otherwise subject to a stricter regulation. That is, domestic authorities must consider the potential cooperation and contestability among foreign banks in different international markets when assigning their δ levels. Following a similar reasoning, an equilibrium in (second best) levels of corruption (i.e. allowing a subset banks to enjoy more favourable policies and higher opening levels) could be defined in this extended version of the model, see Wei and Wu (2002) for some stylized facts on domestic corruption and the entry incentives of foreign banks. Finally, a similar analysis can be also applied when considering the heterogeneous set of domestic banks.

(2) The increase in the openness of the financial system may foster economic growth but also constitutes a destabilizing mechanism on the country, since it increases its exposure to international financial fluctuations. The recent literature on the competition versus risk trade-off suggests a U-shaped relation when allowing for imperfect correlation in loan defaults, see Martinez-Miera and Repullo (2010). This type of result adds to an extensive literature showing that rapid increases in credit are associated with a higher likelihood of systemic banking distress, see Demirgüç-Kunt and Detragiache (2005). Therefore, macroeconomic and monetary stability are requisites for the process of financial deepening that must also be monitored and regulated by a sound authority. These requirements are constrained by the standard information asymmetries and agency and coordination problems inherent to financial

transactions and markets, see Beck (2013). In this regard, Beck (2013, p. 3) provides a review of the literature emphasizing "the structure of legal institutions and the financial system as being the outcome of political decision processes that might not necessarily maximize aggregate welfare." As a result, two main types of government and domestic authorities may be considered.

Section 2.1, on one hand, domestic authorities may try to foster the development of the country and the creation of a sound and efficient financial system. That is, the political and regulatory authorities are assumed to be competent and benevolent. In this case, domestic authorities may define stabilizing policies to reduce the risks derived from an increase in competition and monitor the pattern of financial liberalization while establishing cross-border regulatory frameworks to mitigate the risks stemming from increased international financial integration, see Beck (2013).

Section 2.2, in the same way, private domestic interests may dictate the policies of the government. In this case, Perotti and Volpin (2004) show that in countries with lower political accountability and diffusion of information there is lower entry of new firms into industries more reliant on external finance. Consequently, domestic economies would be more prone to stagnation and therefore require substantial increments in the level of borrowing from foreign banks, see Wei and Wu (2002).

With all the elements described above in mind, bank managers as well as domestic bureaucrats should try to understand and account for the complex interactions following from the opening and deepening process of a country's financial system. In particular, even if full cooperation is assumed on both sides, the increments in risk associated with this process may lead any of the two parties or both of them to an undesirable (equilibrium) state. This risk must be accounted for by the foreign and local banks and the domestic institutions when designing their strategies and policies.

Finally, note that incorporating all these elements into the current model is not particularly complicated. The current model aggregates the probabilities assigned by the domestic authorities into a unique expression and assumes a Bayesian pooling equilibrium through a unique δ value that must be officially imposed and enforced on all foreign banks. Thus, disaggregating the probabilities of the domestic authorities and separating the Bayesian equilibrium should constitute immediate extensions of the model.

7. Conclusion and future research directions

Foreign banks recognize the importance of the largely underdeveloped retail banking segment in an emerging economy and the government understands their interest and is, therefore, selective by placing strict criteria on the type of banks that could acquire stakes in a domestic bank or incorporate, and by specifying conditions on their required cooperation with domestic banks and the development of the banking system. The competitive effect on domestic banks of the opening of an underdeveloped financial system to foreign competitors could lead to a decrease in their profits as domestic agents move their deposits to the better reputed, technologically superior, and more competitive foreign banks. This could also occur where foreign banks focus on specific segments or niche markets. While a dual banking system may emerge between niche market foreign banks and domestic banks, the government, nevertheless, may consider that there should be sufficient spillover of knowledge, products, processes and technology to develop domestic banks and the banking

system. Furthermore, it may also consider that through these entry restrictions foreign banks could not control the banking system and would not dilute the government's ability to control and contain information flows. The results illustrate how initial entry restrictions may be imposed on foreign banks by regulatory institutions in order to guarantee a specified cooperation level both with them and with domestic banks.

The dynamic optimality of this type of behavior may be analyzed using the theoretical framework defined throughout the paper. Foreign banks would face the same set of possible strategies while being allowed to signal their expected behavior as their interactions with domestic banks develop through time. Regulatory institutions, therefore, should choose the optimal restriction level as the reputation of domestic banks increases due to their interactions with the foreign banks. Simultaneously, the game should be considered at a global level and account for the gains of integrating a domestic economy and competing within a globalized financial system. Further progressive relaxation of entry restrictions would define the perfect Bayesian equilibria of the subsequent set of continuation games if, together with other technical assumptions introduced in Subsection 5.3, the respective payoffs derived from this opening increase as the domestic economy integrates and competes within the global financial system.

Finally, note that if regulatory institutions were able to gather, a priori, additional information regarding the intended cooperation strategies of foreign banks on an individual basis they could try to select those banks whose expected level of cooperation is higher among the set of bank entry requests submitted. As a result, the corresponding signaling entry game would be played between the preferred subset of foreign banks and the regulatory institutions. This extension of the current setting allows for strategic alliances to be formed among different types of foreign banks in order to try to increase the δ openness level of the domestic economy. The resulting analysis and equilibria would depend, among others, on the preferred form of entry of foreign banks, their choice of market segment to exploit, the expected evolution of the openness level and the existing interconnections within other financial markets. Considering interactions among foreign banks at the global financial market level would take the model in the direction of the international trade literature with reputation and network-related topics arising in variants of the current strategic environment.

References

Abiad, A., Detragiache, E. and Tressel, T. (2008), "A new database of financial reforms", Working Paper No. 08/266, International Monetary Fund (IMF), Washington, DC.

Agenor, P.R. (2001), "Benefits and costs of international financial integration: theory and facts", Working Paper No. 2699, World Bank Policy Research, Washington, DC.

Aghion, P., Howitt, P. and Mayer-Foulkes, D. (2005), "The effect of financial development on convergence: theory and evidence", *Quarterly Journal of Economics*, Vol. 120 No. 1, pp. 173-222.

Aghion, P., Bacchetta, P., Rancière, R. and Rogoff, K. (2009), "Exchange rate volatility and productivity growth: the role of financial development", *Journal of Monetary Economics*, Vol. 56, pp. 494-513.

Arcand, J.L., Berkes, E. and Panizza, U. (2012), "Too much finance?", Working Paper No. 12/161, International Monetary Fund (IMF), Washington, DC.

Arndt, H.W. (1988), "Comparative advantage in trade in financial services", *Banca Nazionale del Lavoro Quarterly Review*, Vol. 41 No. 164, pp. 67-78.

Barth, J.R., Caprio, G. and Levine, R. (2008), "Bank regulations are changing: for better or worse", World Bank Policy Research Working Paper No. 4646, The World Bank, Washington, DC.

Beck, T. (2013), "Finance, growth and fragility: the role of government", Discussion Paper No. 9597, Centre for Economic Policy Research, London.

Beck, T. and Feyen, E. (2013), "Benchmarking financial systems: introducing the financial possibility frontier", Policy Research Working Paper No. 6615, The World Bank, Washington, DC.

Beck, T., De Jonghe, O. and Schepens, G. (2013), "Bank competition and stability: cross-country heterogeneity", *Journal of Financial Intermediation*, Vol. 22 No. 2, pp. 218-244.

Bhattacharya, R. (2013), "Inflation dynamics and monetary policy transmission in Vietnam and emerging Asia", Working Paper No. 13/155, International Monetary Fund (IMF), Washington, DC.

Boyd, J.H., Levine, R. and Smith, B.D. (2001), "The impact of inflation on financial sector performance", *Journal of Monetary Economics*, Vol. 47 No. 2, pp. 221-248.

Brezigar-Masten, A., Coricelli, F. and Masten, I. (2008), "Non-linear growth effects of financial development: does financial integration matter?", *Journal of International Money and Finance*, Vol. 27 No. 2, pp. 295-313.

Buckley, P.J. and Hashai, N. (2009), "Formalising internationalisation in the eclectic paradigm", *Journal of International Business Studies*, Vol. 40 No. 1, pp. 58-70.

Caron, C. and Lafay, T. (2008), "How risk disciplines pre-commitment", *Theory and Decision*, Vol. 65 No. 3, pp. 205-226.

Cartwright, E. and Wooders, M. (2009), "On purification of equilibrium in Bayesian games and expost Nash equilibrium", *International Journal of Game Theory*, Vol. 38 No. 1, pp. 127-136.

Casson, M.C. (1989), "The economic theory of multinational banking: an internalisation approach", Discussion Paper in International Investment and Business Studies No. 133, University of Reading, Reading.

Chari, V.V. and Kehoe, P.J. (2003), "Hot money", *Journal of Political Economy*, Vol. 111 No. 6, pp. 1262-1292.

Claessens, S., Demirguc-Kunt, A. and Huizinga, H. (2001), "How does foreign entry affect domestic banking markets?", *Journal of Banking and Finance*, Vol. 25 No. 5, pp. 891-911.

Demirguc-Kunt, A. and Detragiache, E. (2002), "Does deposit insurance increase banking system stability? An empirical investigation", *Journal of Monetary Economics*, Vol. 49 No. 7, pp. 1373-1406.

Demirgüç-Kunt, A. and Detragiache, E. (2005), "Cross-country empirical studies of systemic banking distress: a survey", *National Institute Economic Review*, Vol. 192 No. 1, pp. 68-83.

Detragiache, E., Tressel, T. and Gupta, P. (2006), "Foreign banks in poor countries: theory and evidence", Working Paper No. WP/06/18, International Monetary Fund, Washington, DC.

Dunning, J.H. (1988), "The eclectic paradigm of FDI: a restatement and some possible extensions", *Journal of International Business Studies*, Vol. 19 No. 1, pp. 1-31.

Dunning, J.H. (1998), "Location and the multinational enterprise: a neglected factor?", *Journal of International Business Studies*, Vol. 29 No. 1, pp. 45-66.

Dunning, J.H. (2001), "The eclectic (OLI) paradigm of international production: past, present and future", *International Journal of the Economics of Business*, Vol. 8 No. 2, pp. 173-190.

Federal Reserve Bank of San Francisco, Country Analysis Unit (2011), "Banking reform in Vietnam", Federal Reserve Bank of San Francisco, Country Analysis Unit, San Fransisco.

Foreign Investment Agency of the Ministry of Planning and Investment and the US Agency for International Development (2005), "The impact of the US-Vietnam bilateral trade agreement on overall and US foreign direct investment in Vietnam", Foreign Investment Agency of the Ministry of Planning and Investment and the US Agency for International Development, Hanoi.

Fudenberg, D. and Tirole, J. (1991), *Game Theory*, MIT press, Cambridge.

Gao, L. and Kling, G. (2006), "Regulatory changes and market liquidity in Chinese stock markets", *Emerging Markets Review*, Vol. 7 No. 2, pp. 162-175.

Gerardia, D. and Myerson, R.B. (2007), "Sequential equilibria in Bayesian games with communication", *Games and Economic Behavior*, Vol. 60 No. 1, pp. 104-134.

Goyal, R., Marsh, C., Narayanan, R., Wang, S. and Ahmed, S. (2011), "Financial deepening and international monetary stability", Staff Discussion Note No. 11/16, International Monetary Fund (IMF), Washington, DC.

Gray, J.M. and Gray, H.P. (1981), "The multinational bank: a financial MNC?", *Journal of Banking and Finance*, Vol. 5 No. 1, pp. 33-63.

Hellmann, T.F., Murdock, K.C. and Stiglitz, J.E. (2000), "Liberalization, moral hazard in banking, and prudential regulation: are capital requirements enough?", *American Economic Review*, Vol. 90 No. 1, pp. 147-165.

Hindley, B. and Smith, A. (1984), "Comparative advantage in trade in services", *World Economy*, Vol. 7 No. 4, pp. 369-390.

International Finance Corporation (2008), "Vietnam financial sector diagnostic", International Finance Corporation, Washington, DC.

International Monetary Fund (2012), "Enhancing financial sector surveillance in low-income countries – financial deepening and macro-stability", policy paper, April 16.

Levine, R. (2005), "Finance and growth: theory and evidence", in Aghion, P. and Durlauf, S.N. (Eds), *Handbook of Economic Growth*, Elsevier, Amsterdam, pp. 865-934.

Lundan, S.M. (2010), "What are ownership advantages?", *Multinational Business Review*, Vol. 18 No. 2, pp. 51-70.

McKinnon, R.I. (1973), *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*, Johns Hopkins University Press, Baltimore, MD.

Martinez-Miera, D. and Repullo, R. (2010), "Does competition reduce the risk of bank failure?", *Review of Financial Studies*, Vol. 23 No. 10, pp. 3638-3664.

Mukherjee, V. and Ramani, S.V. (2011), "R&D cooperation in emerging industries, asymmetric innovative capabilities and rationale for technology parks", *Theory and Decision*, Vol. 71 No. 3, pp. 373-394.

Noy, I. (2004), "Financial liberalization, prudential supervision, and the onset of banking crises", *Emerging Markets Review*, Vol. 5 No. 3, pp. 341-359.

Obstfeld, M. (2007), "The Renminbi's Dollar peg at the crossroads", *Monetary and Economic Studies, Institute for Monetary and Economic Studies, Bank of Japan*, Vol. 25 No. S1, pp. 29-56.

O'Connor, A. (2005), *Trade, Investment and Competition in International Banking*, Palgrave Macmillan, New York, NY.

Parente, S.L. and Prescott, E.C. (1994), "Barriers to technology adoption and development", *Journal of Political Economy*, Vol. 102 No. 2, pp. 298-321.

Perotti, E. and Volpin, P. (2004), "Lobbying on entry", Discussion Paper No. 4519, Centre for Economic Policy Research, London.

Phan, K.N. and Ghantous, N. (2013), "Managing brand associations to drive customers' trust and loyalty in Vietnamese banking", *International Journal of Bank Marketing*, Vol. 31 No. 6, pp. 456-480.

Piñeiro Chousa, J., Khan, H.A., Melikyan, D. and Tamaziana, A. (2005), "Assessing institutional efficiency, growth and integration", *Emerging Markets Review*, Vol. 6 No. 1, pp. 69-84.

Samuelson, P.A. (1948), "International trade and the equalisation of factor prices", *The Economic Journal*, Vol. 58 No. 230, pp. 163-184.

Sanna-Randaccio, F. and Veugelers, R. (2007), "Multinational knowledge spillovers with decentralised R&D: a game-theoretic approach", *Journal of International Business Studies*, Vol. 38 No. 1, pp. 47-63.

Shaw, E.S. (1973), *Financial Deepening in Economic Development*, Oxford University Press, New York, NY.

State Bank of Vietnam (2010), Memo 7723/NHNN-TT, State Bank of Vietnam, Hanoi.

The Banker (2007), "The silk glove that needs an iron fist", The Banker, available at: www.thebanker.com/World/Asia-Pacific/Vietnam/The-silk-glove-that-needs-an-iron-fist

The Banker (2008), "Foreign banks to the rescue", The Banker, available at: www.thebanker.com/World/Asia-Pacific/Vietnam/Foreign-banks-to-the-rescue

Verbeke, A. and Yuan, W. (2010), "A strategic management analysis of ownership advantages in the eclectic paradigm", *Multinational Business Review*, Vol. 18 No. 2, pp. 89-108.

Wei, S.J. and Wu, Y. (2002), "Negative alchemy? Corruption, composition of capital flows, and currency crises", in Edwards, S. and Frankel, J.A. (Eds), *Preventing Currency Crises in Emerging Markets*, University of Chicago Press, London, pp. 461-506.

World Bank (2009), "Vietnam development report: capital matters", World Bank Report to the Vietnam Consultative Group Meeting, Hanoi, 2008, World Bank, Washington, DC.

World Bank (2010), *Vietnam Development Report*, World Bank, Washington, DC.

Corresponding author
Dr Madjid Tavana can be contacted at: tavana@lasalle.edu